

# **Basin-wide Non-game Native Fish Survey 2010 Annual Report**



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## **Introduction**

Lake Tahoe is an international treasure that is esteemed for incredible water quality and clarity. Great interest and attention have surrounded Lake Tahoe's water for centuries. With all of the attention paid to the lake, it is surprising more attention has not been given to the tributaries and the fish communities that inhabit them. Very few biological assessments of the native non-game fish communities have occurred, and those that were attempted have limited information and focus on the non-native salmonid species of Lake Tahoe.

The Tahoe Regional Planning Agency (TRPA) and U.S. Forest Service (USFS) compiled a guide for planning in 1971 called "Fisheries of the Lake Tahoe and its Tributary Waters" (TRPA 1971). Many institutions and agencies contributed to this publication, but most of the information pertains to sport fisheries. Information pertaining to the native species is presumed in most cases, especially for the smaller non-game species. This publication is, unfortunately, the most comprehensive guide to fish communities in the tributaries to Lake Tahoe.

Dennis Murphy and Christopher Knopp published the "Lake Tahoe Watershed Assessment" in 2000. This assessment was intended to define existing and future desired conditions for key ecosystem elements and environmental indicators, and lists the species found in the Tahoe basin. However, it doesn't include information on fish distributions and community compositions.

Most of Tahoe's native fish species have been overlooked for centuries. Even the native Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), was extirpated from Lake Tahoe in the 1920's due to a number of human influences. Habitat degradation and non-native species introduction, such as lake trout and brook trout, have had effects on many of the native fish species in the basin. Tahoe's native fish populations remain relatively unknown since no recent surveys have taken place. No documentation of native non-game fish in the lake is available prior to 1930 (Murphy and Knopp 2000). It is for these reasons it is imperative that a basin-wide fish assessment in Lake Tahoe's tributaries be conducted.

The intent of this assessment is to build a baseline to support future fisheries management in the Lake Tahoe basin. Determining species distribution and relative abundance, as well as stream habitat conditions, will provide information for future watershed management projects. Continued assessment is necessary to complete the dataset and determine changes to fish community composition in the future.

## **Methods**

The Lake Tahoe Basin Management Unit (LTBMU) Aquatics Program has been conducting fish surveys in inlet tributary streams of Lake Tahoe since 2007. In 2010, surveys started in June when stream discharge reached a safe wadeable level and continued through August when other projects took priority. Spot shocking did occur due to impassible stream sections because of large woody debris, subsurface flow, and thick riparian vegetation.

All surveys were conducted using backpack electrofishers. The backpack electrofishers were adjusted as necessary to accommodate for electrical conductivity and to cause the least amount

of injury to fish while still being effective. Crew members were trained to safely and appropriately operate backpack electrofishers. Field safety precautions were discussed and all members of the aquatics crew reviewed and signed an electrofishing and stream wading job hazard analysis (JHA). All members of the crew were trained in identification of native and non-native fish species in both adult and juvenile stages.

Two crew members are required for these stream surveys (1 backpack shocker, 1 netter/processor). Three people make it much easier, so the person shocking does not need to carry the recovery bucket. The third person can also help hold back riparian vegetation, such as willow and alder. All surveys begin as close to the stream mouth as possible. Exceptions include inaccessible terrain (i.e. culverts, subsurface flow, waterfalls) and private land boundaries. Sampling units are 100 m. If the end of a habitat unit is in the middle of a habitat type, (Pool/riffle/run), it is extended and measured to the end of the habitat type. For each new 100 m sampling unit the dominant habitat type, unit length, and UTM's are recorded. UTM coordinates are taken at the beginning and end of each reach to make mapping easier on ArcGIS. UTM's are recorded using a Trimble GeoXH handheld GPS unit.

Crew members carefully walk through the stream with the electrofisher proceeding first and the netter/processor follow closely behind to capture any stunned fish (Figure 1). All fish captured are placed in a recovery bucket full of water until they can be processed. During the height of summer water temperatures are high, and dissolved oxygen in the recovery bucket is depleted quickly, especially when large quantities of fish are captured in a reach. It is imperative to refresh the water in the recovery bucket frequently to improve survivability. Occasionally it is necessary to divide a unit in half to facilitate more frequent fish processing to avoid increased mortality rates. At the end of each unit fish are processed, recording the species, size class (0-5cm, 5-10cm, 10-20cm, 20-30cm, 30+cm), and quantity captured. The fish are released downstream in a previously sampled reach. All field data is entered into an Excel spreadsheet and checked for accuracy.



Figure 1. Crew electrofishing

Decontamination of field gear to prevent spread of disease and aquatic invasive species was accomplished using Quat-128 before entering a new stream. Field gear was thoroughly washed and then disinfected at the work station in a one ounce to one gallon solution of Quat-128. Field gear was soaked in the solution for a minimum of five minutes then washed and allowed to dry completely. Disinfection of wading boots and waders is mandatory as these tend to stay wet for long periods.

## Results

Seven species of fish were sampled this field season. Four of these species are native, including the Lahontan redbside shiner (*Richardsonius egregius*), Paiute sculpin (*Cottus beldingii*), speckled dace (*Rhinichthys osculus*), Tahoe Sucker (*Catostomus tahoensis*), and Mountain sucker (*Catostomus platyrhynchus*). Three species were non-native including brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), and rainbow trout (*Oncorhynchus mykiss*). Reference Table 1 for distribution of species in each creek sampled. Native fish species were generally uncommon, except Paiute sculpin in Trout Creek, and non-native trout species were the most common members of the fish communities. Native fish tend to be concentrated in downstream reaches near the lake, and decrease as the survey moves upstream. Fish native to the Lake Tahoe basin and historically present (TRPA and USFS 1971) not sampled in 2010 include the Lahontan cutthroat trout, mountain whitefish (*Prosopium williamsoni*) and Tui chub (*Gila bicolor*).

Table 1. Fish species surveyed and distribution in creeks sampled.

Species	Trout Cr.	Incline Cr.	McFaul Cr.
Lahontan Redside Shiner		3	
Speckled Dace	25		
Tahoe/ Mountain Sucker		45	
Rainbow Trout	63	128	
Brook Trout	233	507	
Brown Trout	340	1	
Paiute Sculpin	269		
Unknown Trout	2	15	

### Incline Creek

Incline Creek is a large drainage located on the northeast corner of the lake with the mouth entering Lake Tahoe at Ski Beach in Incline Village, NV. Almost the entire stream sampled in 2010 was on private land. The FS boundary is located just north of Diamond Peak Ski Resort in the Tyrol Village neighborhood. Incline Creek was sampled continuously from the mouth for roughly 1.2 river miles (to UTM coordinates N: 4348965 E: 764771). Spot shocking then began from the Forest Service (FS) boundary (N: 4349755 E: 765527), and continued upstream until fish were no longer found. About 4500 m of the main stem and tributaries of Incline Creek were spot shocked to determine the most upstream location of fish presence. The farthest up the drainage surveyed was in the headwaters (at the coordinates N: 4353051 E: 766940). Non-native trout were the most abundant fishes in Incline Creek (Figure 6). Very few native fishes were found above Lakeshore Blvd. Large culvert barriers on all road crossings likely attribute to the difference in species composition between reaches.

Forty-two Tahoe/mountain suckers were surveyed in the first few hundred meters of stream (Figures 2-5). The field crew was unable to identify the sucker species based on the number of papillae around the mouth. Some seemed to have a thin row of upper papillae with a very deep lower notch which is a combination of characteristics for both species. Spawning colors also made it hard to differentiate. This is possibly based on crew inexperience in sampling and

identifying suckers. Genetic samples should be taken in the future to identify the species. Upon further analysis we may assume most of the suckers are Tahoe suckers.

Brook trout were the only fish species found above the Forest Service boundary. Spot shocking was used above the FS boundary due to beaver dam complexes, subterranean flow, and dense stands of vegetation. Fish were not found above UTM coordinates N: 4351894 E: 0766217.



Figure 2 . Sucker sampled in Incline Creek



Figure 3. Sucker sampled in Incline Creek



Figure 4. Sucker sampled in Incline Creek



Figure 5. View of papillae (Tahoe Sucker)

### **Trout Creek**

Previous data indicates there were known populations of Tahoe sucker, speckled dace, Lahontan redband shiner, Paiute sculpin, Tui chub, mountain whitefish, brook trout, brown trout, rainbow trout and kokanee salmon (*Oncorhynchus nerka*) in Trout Creek (TRPA and FS 1971). This is an interesting stream, as most of the substrate consists of sand and gravel and seems to have low productivity. Looks are deceiving and this stream hosts a nice assortment of native and non-native fish.

Sampling began in 2010 just south of Pioneer Trail upstream roughly 0.65 miles. The first few thousand meters consisted of a sinuous sand/gravel bottomed stream. Shocking became difficult upstream of the meadow section due to the amount of woody debris over the creek so spot shocking was implemented. Fish were hard to net and shocking became very slow. The fish community was consistent throughout the entire sample area. Paiute sculpin was the most common native fish sampled and brook trout was the most common non-native species found (Figure 7). Time constraints did not allow Trout Creek to be sampled fully, so many miles of stream need to be surveyed to reach the headwaters.

## **McFaul Creek**

McFaul Creek is located on the east shore near Round Hill, NV. Private land prevented the survey starting at the lake. Surveying began after a large sub-surface fish barrier above a man-made lake on private property. The first 100 m of survey occurred on this section of private land, because the crew thought they had reached FS boundary. After the Forest Service boundary, shocking was continued for 200 meters upstream. No fish were found throughout the whole 300 m. Surveying should be completed for this creek above the Forest Service boundary.

## **Discussion**

Without hard evidence to support the historic presence or absence of species in the tributaries of Lake Tahoe it is difficult to assess the information gathered over the course of the basin-wide fish survey. There is now a dataset for the current extent of species in tributaries being created and filled. Further surveys are necessary to provide a complete dataset of the entire Lake Tahoe basin. The Upper Truckee River and many east shore tributaries still need to be surveyed. Trout and Cold Creek surveys need to be completed further up their drainages. Collaboration with Nevada Department of Wildlife on their findings may be included in this database in the future, but current information suggests further sampling by the Forest Service is necessary on the Nevada side of Lake Tahoe.

Non-native trout have occupied nearly every habitat in all Lake Tahoe tributaries. Native fish, like the mountain whitefish and Tui chub, historically known to occur in Trout Creek, were not found anywhere during the 2010 field season, indicating a significant impact on their distribution. It is known that introductions of non-native species have greatly reduced populations of native forage fish within Lake Tahoe. Establishing a foundation of information and continued monitoring will explore the impact of non-native fish on native non-game fish.

Fish distribution in the tributaries may vary significantly from one season to the next as different species come and go to spawn. For instance some Lahontan redbreast shiners and Tahoe suckers are known to use creeks to spawn and then return to the lake, while some populations are resident populations (possibly due to barriers like beaver dams). Since sampling occurs in summer, creeks should be surveyed during different seasons to capture potential potamodromous species. Streams should be monitored and sampled on a regular basis (at least every 5 years) aiming to sample creeks in different months than previous years and to capture annual variations in fish distribution.

To improve future implementation of this project a field guide to Lake Tahoe basin fishes was started by the field crew, located on the FS network drive. A guide to Tahoe fishes with complete descriptions and photos will help ensure proper identification. Included in this guide to Tahoe fishes are some pictures used in the identifying of fry and juvenile trout, which are the toughest to identify. Additional pictures of the 0-5cm and 5-10cm size classes of salmonids need to be taken for help with identification. A class or seminar in the beginning of the season would be very helpful to make sure all of the crew is on the same page with fish identification. Fish identification is fundamental to this project and early instruction is necessary.

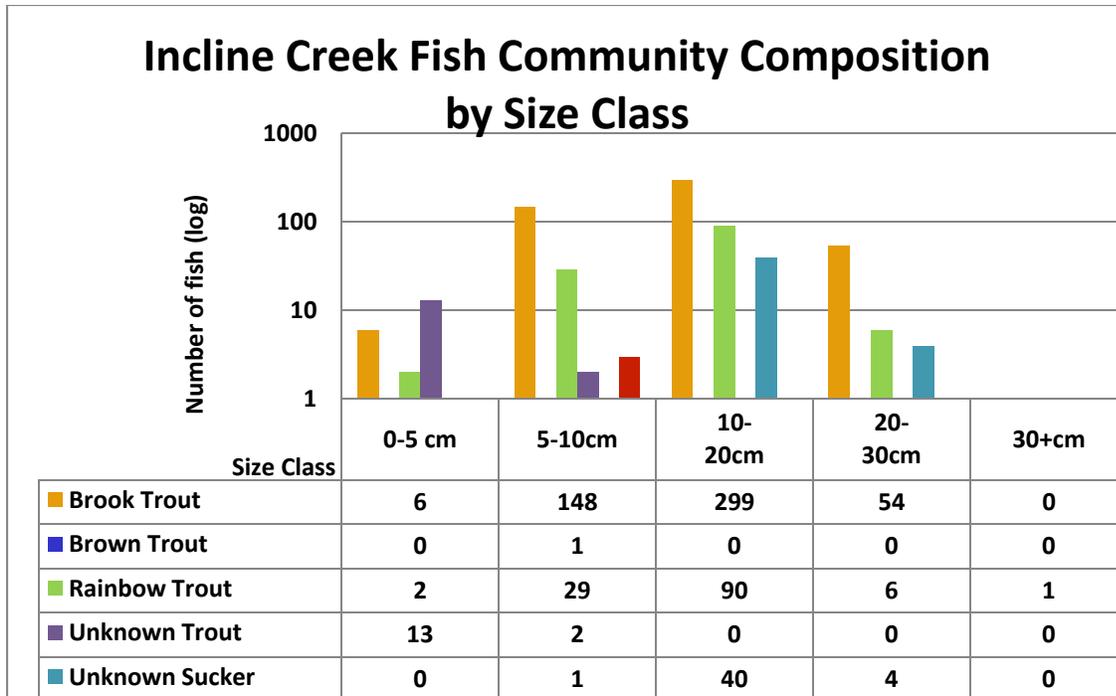


Figure 6. Incline Creek Fish Community by size class.

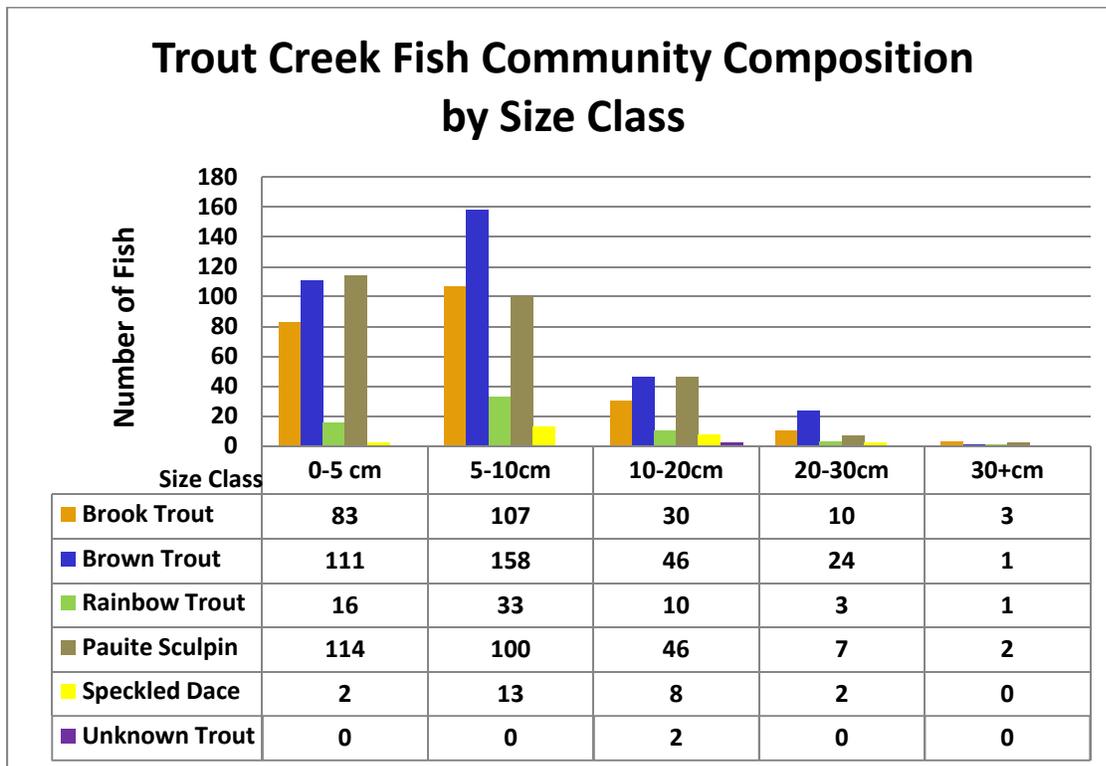


Figure 7. Trout Creek Fish Community by size class.

## **REFERENCES**

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